ENTOMOLOGY.

EATON'S MONOGRAPH OF THE MAY-FLIES, PART I.—This is a well-worked and finely-illustrated memoir, which will necessarily remain a classic. For the first time we have a thorough treatment of the generic and specific characters of this group, comprising all the known living species of the globe, the American species receiving a good share of attention, being mainly from the Hagen collection of the museum at Cambridge.

Beginning with an account of the structure of the adult insects, while we have no comparisons made with other groups of insects, nor any attempt at a general morphological treatment of the subject, the reader is supplied with a judicious and reliable account of the different parts of the body, particularly the wings, the venation being discussed at length. We prefer the term "vein" to nervures, as the "veins" *are* temporarily at least blood-vessels, and have nothing in common with nerves; as the term "nervure" would suggest.

The facts stated as to the habits and mode of oviposition are fresh, and will be doubtless novel to our readers.

The popular superstition, says Mr. Eaton, that May-flies are strictly ephemeral, is fallacious in most instances. "It is true that the adult insect cannot eat, owing to atrophy of its mouth-organs and to the condition of its alimentary canal; but, provided that the air be not too dry, the imagines of many genera can live without food several days. Tradition states that Curtis kept a female Cloëon alive three weeks; this is an exceptionally long period, for in general an individual in confinement becomes perceptibly shrunken within three days, and is dead by the fourth day, if not before. Apparently there is some correspondence between the length of time spent in the subimago stage and the duration of the life of the imago; when the former amounts to twelve or twenty-four hours and upwards, the latter lasts more than a day; but when the change into imago takes place within a few minutes of the insects quitting the nymph skin, its life is fugitive, passing away in the course of the evening or early morning. In some genera of short-lived Ephemeridæ the subimago skin is partially or altogether persistent in one or the other of the sexes; and such portions of it as may be shed are moulted while the insect is in full flight." The longer-lived flies issue from the nymph-skin in a rather more matured condition than the others. The change from nymph to subimago is effected while the insect is floating at the surface of the water, buoyed up by gas which has accumulated within the alimentary canal and between the new and the old integuments of the body. The moult having been transacted in the ordinary manner, the subimago, standing upon the water with the wings erect awaits a favorable moment for flying to shelter. Fluttering steadily upwards it mounts aloft, some-

times to a considerable elevation, presently making its way to trees, walls or herbage, &c., likely to afford it a suitable resting place. Then it assumes the posture characteristic of its genus during repose. It may stand either upon all of its feet, or upon only the two hinder pairs; and the fore legs extended in advance, off the ground, may in this last case be held either close together or else apart from each other. The caudal setæ, in most instances divergent, are sometimes placed alongside of one another horizontally, or slanting upward.

The mode of flight of these graceful creatures is then described; usually, especially in the males, consisting of an intermittent action of the wings, which "results in a dance-like motion almost vertically up and down,—a fluttering swift ascent, and then a passive, leisurely fall, many times repeated." Other habits and the occasional swarming of certain May-flies are referred to, and their reproductive habits.

The facts regarding oviposition, must, we think be new to our readers. "Some short-lived species discharge the contents of their ovaries completely *en masse*, and the pair of fusiform or subcylindrical egg-clusters laid upon the water rapidly disintegrate, so as to let the egg sink broadcast upon the river-bed. The less perishable species extrude their eggs gradually, part at a time, and deposit them in one or the other of the following manners:—either the mother alights upon the water at intervals to wash off the eggs that issued from the mouth of the oviducts during her flight; or else she creeps down into the water—enclosed in a film of air, with her wings collapsed so as to overlie the abdomen in the form of an acute narrowly linear bundle, and with her setæ closed together —to lay her eggs upon the underside of stones, disposing them in rounded patches, in a single layer evenly spread, and in mutual contiguity. This has been witnessed by me several times, and in the case of several species of Baëtis. The female on the completion of her labor usually floats up to the surface of the water, ineffectively swimming with her legs, and, on emerging, her wings all at once are suddenly unfolded and erected; she then either flies away, or (as often happens) if her setæ have chanced to become wet and cannot become extricated from the water, she is detained by them until she is drowned. In some instances, however, the female dies under water beside her eggs."

The eggs are indefinitely numerous, some subrotund, others elliptical.

"Professor L. Calori (1848) and Dr. E. Joly (1877) have recorded instances of larviparition observed by them in *Cloëon dipterum*. Although they supposed that the young were produced from impregnated eggs retained within the mother, perhaps for some weeks, it may be conjectured with equal, if not greater probability, that these were the produce of unfertilized ova advanced

to maturity within the nymph and hatched as soon as she became an imago."

The young are then described; and the term nymph, since the larval and pupal stages are so much alike, is applied to all the "subaqueous stages in the development of the young after it is hatched." They mostly feed upon either mud or minute aquatic vegetation, such as covers stones and the larger plants; but (judging by their mandibles and maxillæ) some must be predaceous. The nymph of Palingenia is said to remain such one year.

The character and peculiarities of the nymph are given in great detail; while the means of distinguishing the subimago from the adult are stated. After a history of the classification of the Ephemeridæ, the bulk of the memoir is devoted to the systematic description of the genera and species. The illustrations are noteworthy from the attention given to the venation of the wings and other details, which, of course, add vastly to the value and permanency of the work; twenty-four plates being filled with the sketches, which are drawn upon a large scale.

NOTES ON MOTHS.—We have long had a specimen of the very rare *Sphinx elsa* Strecker, from Salt Lake City, Utah, given us by Mr. J. L. Barfoot, curator of the Salt Lake museum. It was originally described by Strecker from Arizona, and is well figured in his "Lepidoptera, indigenous and exotic." Like other moths from the Great Basin this has a peculiarly faded and bleached appearance, probably resulting from the light soil and bright skies of Utah and adjoining territories.

Smerinthus imperator Strecker occurred in a collection of moths, from Reno, Nevada, presented to us in 1877 by Rev. C. H. Pope. It agrees well with Strecker's figure, and is undoubtedly the same as the Arizona form; but until we have a suite of specimens of the Eastern *S. modestus* and the Western var. *occidentalis* H. Edw., from the Pacific coast for comparison, it will be difficult to decide whether it is specifically distinct from *S. modestus* of the Atlantic coast.

The following faunal notes on Bombycidæ may prove of interest:

Stenopis argenteomaculatus Harris, was taken by us at twilight in Gilead, Maine, in July. The second outer triangular silvery spot is obsolete; but the specimen agrees with Harris' figure in the style of marking. *Stenopis argentata* Pack., has been taken twice in Providence, in 1883, in June. One example belonging to Mr. G. E. Gray lacks the second outer silvery spot.

From Mr. J. L. Barfoot, of Salt Lake City, we have received *Pyrrharctia isabella;* from Dr. Palmer, in Southern Utah, and from Mr. Siler, of Ranch, Utah, specimens of very white bleached *Pseudohazis hera,* showing the same climatic effects as wrought

upon *Sphynx elsa*, *Euleucophæus gloverii*, *Gloveria arizonensis*, etc. In *P. hera* the discal dots are linear. *Epicallia virginalis* var. *ochracea* has been sent us from Southern Utah.

In Colorado we collected several years ago *Arctia achaia* Grote, Idaho Springs, July 6th; and with it occurred *Leucarctia permaculata* Pack. *Lycomorpha palmerii* was not infrequent at Manitou, July 16th; it was originally described by us from Southern California. In South Park Colorado, occurred *Tolype velleda.*

The localities of the following Geometrids are new: *Dasyfidonia avuncularia* (Guen.) Reno, Nevada; and in the same collection *Marmopteryx marmorata;* from Colorado (Scudder) *Selidosema inturnaria;* the same, var. *californiaria*, from Beaver Mts., Utah (Palmer in Scudder's collection).—*A. S. Packard, Jr.*

THE BIRD-LOUSE (*Dermaleichus pici-pubescentis*).—In November, 1883, I found this interesting mite, first described by Professor Packard as occuring on *Picus pubescens*, on a specimen of the hairy woodpecker (*P. villosus*). They were especially numerous on the barbules of the feathers at the upper part of the throat, although they were also found on the feathers situated on the under side of the wings.

Besides the forms described by Professor Packard (see "Guide to Study of Insects"), there was another form, which is probably the hexapodous stage of the female, which has not yet been described.—*Clarence M. Weed.*

ENTOMOLOGICAL NOTES.—The transactions of the tenth volume of the American Entomological Society, parts 3 and 4, contain most excellent matter: such as Lord Walsingham's notes on Tineidæ of North America; Mr. John B. Smith's synopsis of the North American Heliothinæ; Dr. Horn's miscellaneous notes and short studies of North American Coleoptera.——Dr. Williston publishes in the eleventh volume of the transactions of this society, a paper on the North American Asildæ, with a description of a new genus of Syrphidæ, with two plates.——Bulletin No. 3, U. S. Department of Agriculture, division of Entomology, comprises reports of observations and experiments in the practical work of the division, made under the direction of the entomologist, Professor C. V. Riley. It contains notes on the army worm, and experiments with pyrethrum, by C. V. Riley; notes on forest tree insects, by A. S. Packard, Jr. (containing descriptions of the transformations of *Eupithecia luteata*, *Caripeta angustioraria* and *Cryptolechia schlagenella*); a report upon the cotton worm in South Texas in the spring and early summer of 1883, by E. H. Anderson; experimental tests of machinery designed for the destruction of the cotton worm, by W. S. Barnard. The most important paper, and one of the best monographic accounts of an interesting group of moths which has appeared in this country, is Dr. James A. Bailey's "Some of the North American Cossidæ, with facts

in the life-history of *Cossus centerensis* Lintner," containing excellent biological matter, and illustrated by two well-engraved plates. The publication of this Bulletin marks a new era in the work and development of the entomological division of the agricultural department, and we hope the publication will be well sustained.——*Psyche*, vol. III, Sept.-Oct., 1882 (issued late in 1883), contains a noteworthy paper by Dr. Geo. Dimmock, on some glands which open externally on insects. Vol. IV, Nos. 115-116 contains Mr. Lintner's "New sexual character in the pupæ of some lepidoptera;" a very just tribute to the memory of J. L. LeConte, by C. V. Riley; the gills of insect larvæ, by G. McCloskie; the screw-worm-fly (*Compsomyia macellaria*), by S. W. Williston.——The oldest Tracheates known are probably two fossil myriopods from the Lower Old Red Sandstone (Devonian) of Scotland, described by B. N. Peach in Proceedings Royal Physical Society of Edinburgh, 1881-82.

ZOÖLOGY.

Occurrence of Chlorophyll in Animals.—C. A. MacMunn bases his conclusions as to the identity of animal and vegetable chlorophyll on the fact that the wave-lengths of centers of the bands of the same solutions of animal and vegetable chlorophyll are the same, and that the wave-lengths of the centers of the bands are the same when the same reagent is added to the respective solutions. Without committing himself to accepting the views of Kraus or Sorby, he applies the term chlorophyll to that coloring matter, or mixture of coloring matters, which can be extracted out of green leaves, such as those of Primula, by means of alcohol, or alcohol and ether. The coloring matter, to which the writer has given the name "enterochlorophyll," and which can be extracted from the liver or other appendage of the enteron of invertebrates, was shown to be probably produced by, and in, the body of the animal, and not food chlorophyll. The absence of parasitic algæ in sections of the livers of certain mollusks which yield enterochlorophyll, shows that this pigment cannot be due to their presence. The writer further showed that Pocklington's observations, published in the *Pharmaceutical Journal* in 1872, on the presence of chlorophyll in the wing-cases of Cantharides beetles, would be verified, and he had succeeded not only in verifying the presence of the principal chlorophyll band in the ether, chloroform, and alcohol solutions of the wing-cases; but the changes produced in the spectra of these solutions on the addition of certain reagents showed the presence of a body indistinguishable from vegetable chlorophyll. Hence, Leydig's conclusion as to the presence of that coloring matter in insects was proved to be correct. However, in the case of green larvæ the occurrence of a band in the red when a strong light is concentrated on the integument may be merely due to the presence of food chlorophyll